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THE RELATION OF SCIENTIFIC MANAGEMENT TO THE WAGE PROBLEM

That the Taylor system of scientific management has made good with manufacturers and employers who know, cannot now in the light of recent history be gainsaid. The sworn testimony of manufacturers before the Congressional Committee on Labor "appointed to investigate the Taylor and other systems of management" is conclusive on this score. The report of the chief of ordnance for 1912 with reference to the working of the system in government arsenals is an illuminating and informing document from an unprejudiced source, which settles the question at least so far as machine-shops are concerned. The application of scientific management to other branches of industry has been spreading widely, not only in this country but abroad in Europe and Japan, and always with the same satisfactory results. In spite of the popular confusion of ideas about what scientific management is and the frequent mistaking of various other "systems" for the Taylor system, the success of the latter in its complete applications is now indisputable, and well-informed managers are aware of that fact.

It is not surprising, however, that the mass of laboring men are as a whole quite uninformed and misinformed on the subject. Men who work in plants organized according to the Taylor system know the facts and are quite willing to admit its success from their point of view. But the majority of working-men have never seen such plants, and in all frankness it must be said that they have been consistently and persistently misinformed, especially by some of their trade-union leaders, in regard to the effect of the system upon the health and wages of the men. This propaganda of misinformation is but a variation of the warfare with which the introduction of machinery was met, and it is likely to have the same effect of retarding the further development of scientific management, unless counteracted by a propaganda of facts. A campaign of education of the working-men is necessary and, if

long enough continued, is bound to be effective. Such a campaign, however, must itself be based upon facts; and in this paper I hope to show the bearing of the Taylor system on the "wage problem."

Of the trinity of materials, machinery, and men that constitutes factory organization, the most important factor is men. Though everyone recognizes this truth, very few have in the past acted upon it. A great deal of attention has been given to the purchase of materials in the cheapest markets, and the getting of materials best adapted to the processes in hand. And, similarly, much thought has been devoted to the technical improvement in machinery and the introduction of inventions. Every up-to-date concern has its purchasing agents, its inspectors and laboratories, its machinists and inventors; but very few seem to have given particular attention to the most fundamental of the three elements—the men.

In spite of the prevalence of the talk about sanitation, safety, welfare, *esprit de corps*, etc., the most vital point of contact between managers and the men is the pay envelope. There is no solution of the problem of apparently conflicting interests between employers and employed that does not involve fundamentally the question of wages.

What is the relation of scientific management to the wage problem? Perhaps the easiest way to make clear the point at which I hope to arrive in this paper is to review briefly the history of wage systems.

It is rather difficult to say which kind of wages came first—day-rates or piece-rates. Probably both have existed ever since one man worked for another. Perhaps piece-rates came first; for we may imagine that, when our primeval ancestors got together and one of them decided to fish for a day if another would make axes that same day, they would swap products with each other. In other words, each was paying the other for a definite product, which is the essence of a piece-rate. In a condition of society in which foresight was not highly developed and complex thought was difficult, such a method was the easier and therefore probably the more common. But when the operations of labor became more

complex and the imagination more comprehensive, one would start to do something for another that would necessarily take more than a day. The workman in the meantime would have to live and could not wait until the product he was working on was finished before getting some kind of payment. His pay evidently could not be for a definite product and must therefore have been on a day-rate. But whatever the origin and the priority of these rates, it is a fact that they have existed side by side through all historic time.

The idea of payment for work involves the notion of equivalence of value, and this notion has crystallized into the common expression, "a fair day's work for a fair day's pay." These terms are exceedingly vague. A fair day's work seems to mean to most people that the workman shall keep busy for the greater part or the whole of the day, or at least appear to be busy. A fair day's wage in most minds means such a wage as will enable a man to live up to the standard of comfort common among his peers in the community. In primitive conditions if a man would work all day and his employer would pay him for that day's work what was necessary to enable him to live, the sense of fairness was satisfied.

Both of these ideas are exemplified in the parable of the man who went out early in the morning to hire laborers for his vineyard; an hour or two later he went out and hired others; late in the afternoon he hired still others; then at the end of the day each was paid a penny. The men that went to work in the early morning protested that, as they had worked longer, they should be paid more. The master of the vineyard, however, maintained that it was his right to pay what he chose, and his idea seems to have been that whether a man worked one hour or ten he needed the penny in order to live. The workmen were going on the theory that a fair day's work means working all day; the employer on the theory that a fair day's wage is what a man needs.

One obvious difficulty with day-wages lies in the fact that, though the wage may be fairly set by public opinion or by organization, the content of a day's work is not by that method established. You may satisfy the workman by giving him what he needs, what he has to have, but you have not necessarily satisfied

the employer that the workman has done a fair day's work merely because he has spent a certain number of hours on the job; for after all the employer's equivalent is not as a rule the mere command of the workman's time but a measurable product.

When the day's wage is set by public opinion or by organization, but the day's work is not, there is a tendency for the day's work to diminish gradually to the point where the workman can just keep his job. That this has happened in many cases is a matter of current knowledge, and is one reason for the dissatisfaction of employers with the day-wage; for the workmen have sometimes abused their opportunity and have done just the least possible; and their opportunity to do this has arisen largely from the fact that the employer has never really known what a fair day's work is.

When this condition becomes intolerable to the employer, the natural, the obvious thing to do is to pay for the unit of product instead of the time employed. The history of piece-rates is well known. On their introduction the employer pays for what he gets and the employee is paid for what he does. Both sides are satisfied and the production increases. The time soon comes when the workman puts forth all the energy he can muster to earn as large a wage for as large a number of units of product as he can possibly produce. The employer is highly pleased with the increased production, but soon begins to worry about the wages he is paying. Then comes the inevitable cut. The workman has himself established the rate of production of which he is capable, and the employer figures a piece-rate on this production which will just provide the man an average living wage. One or two cuts are usually enough to show the workman the futility of putting forth his best efforts under such a system; and the advantages of piece-rates have in many cases been destroyed in this way by the greed and the injustice of the employer. The opportunity for greed and injustice, however, arose from the fact that neither the employer nor the employee really knew what a fair day's work was.

It is generally recognized today that both day-rates and piece-rates are clumsy and inefficient, for the reason that the workman will frequently beat the day-rate and the employer will cut the piece-rate. This is made possible and practically inevitable by

the ignorance on both sides as to what is either a fair day's work or a fair day's wage.

Many efforts have been made to avoid both horns of the dilemma. From the fourteenth century on, legislation was depended upon. Legislation which set wages to meet the conditions existent at the time it was passed was fairly efficient; but the rapid changes in industrial conditions were not followed by equally rapid changes in legislation; with the result that the laws of the market prevailed eventually over the laws of the legislature. In fact near the beginning of our modern era of industrial organization existing legislation had actually become obsolete, and the attempt to regulate wages by act of Parliament was, under the influence of the ideas of Adam Smith, formally and officially given up.

Adam Smith's optimistic philosophy to the effect that if men were left alone the compromise effected by the conflict of their self-interests would work out to the greatest satisfaction of all, was not justified by the event. The Statutes of Labourers, though poorly fitting the conditions at the beginning of the nineteenth century, were some slight protection to the working-man; they established at least a minimum wage and, when they were repealed, the workingman was left at the mercy of his employer, and from his relatively weak position was forced down to and below the limit of endurance. His only resort was organization.

This was the time at which labor unions in the modern sense of the term established themselves, demonstrated the necessity of their existence, and got the foothold which they maintain in England and America and many other countries today. They were the answer of the under dog to the insolent assertion of prerogative on the part of the employers to establish any wages and any conditions which they chose to impose.

Labor unionism has not been exempt from the usual tendency of movements to go too far in the direction in which they started. The unions were organized originally to protect the employee against the aggression of employers; but as they began to feel their power and to exercise it, it was inevitable that in the course of a few decades they should turn the tables on the employers and themselves become the oppressors. They discovered that they

could tell the employers what the latter must pay but that the employers had no means of determining how much work the employees ought to do. The policy of restriction of output has been based on many arguments, but the most primitive and potent reason for it is the selfish tendency of human nature to give as little as possible for what it gets. When the employees through organization acquired the power to determine wages and the employers in their ignorance had no means of determining a fair day's work, a minimum output was the inevitable consequence.

If in some cases this tendency was counteracted by a sense of fairness and mutual dependence, in many more cases it was aggravated by the feeling of conflicting interest and inherent hostility between the two parties. In fact this feeling of hostility has been so prominent as to mislead many men into the idea that to solve the wage problem meant merely to establish cordial relations between the employer and the employee. Many means to this end have been proposed and tried.

One of the earliest attempts to bridge the gulf was to leave the method of payment unchanged but to secure the co-operation of the workingman by the psychological means of kindness, fair treatment, and the development of a spirit of loyalty and of personal satisfaction in doing the job right; this is the basis of the so-called "welfare movement." Experience has shown that where day-wages are paid and there is no established method of determining and enforcing a day's work, the best that can be done is to try to develop the spirit of co-operation by such methods.

There are many objections, however, to most welfare schemes. One reason for their frequent failure is the fact that they are largely personal to the man who installs and develops them. He is unable to resist the temptation to impose upon the workingmen his own ideas of what is best for them. Often also he is arbitrary and capricious. He looks at welfare work as a gratuity on his part which he can extend or withhold at his convenience. Sometimes also, in the excess of his zeal, he carries his welfare activities down to the most personal details of his employee's domestic management and arouses a feeling of strong resentment. But more important than these objections is the common and natural opinion of the

men that the firm which can afford to maintain welfare institutions can just as well afford to pay better wages, and that they (the men) have a right to decide for themselves how these wages shall be spent. And, finally, welfare schemes often bear the aspect of charity to the employee or of advertising for the firm; and in either case they come speedily to destruction.

Some manufacturers have said: "If welfare is charity and charity is disagreeable to the men, let us be businesslike. The success of our concern is the joint product of the men and the management, and it is businesslike for the management to share the profits with the men. We will limit our profits to 10 per cent and all over that we will divide among our employees."

The history of profit-sharing has been as discouraging as that of welfare movements. One or two conspicuous successes may be pointed out; but, on the whole, it is a history of failure. The reasons for this are numerous: in the first place the reward is too remote and uncertain; the workman may wait a year for his dividend and then find that there is nothing to be divided. He is usually suspicious that the accounts are being juggled in the interests of the management. In any case he finds his share of the profits ridiculously small in proportion to the increase of energy he may have put into his work. The most conspicuous example of this is the scheme of interesting the employee in the concern by allowing him to purchase shares; a holder of five shares in a company that has an issue of twenty million may double, treble, or quadruple his output and efficiency without producing the slightest effect upon the dividends on his shares. Beyond and behind all these reasons is the fact that people generally do not consider profit-sharing fair. Profit-sharing is a form of partnership, and a partnership should be for worse as well as for better; but the profit-sharing scheme divides part of the profits among the men and imposes all the losses on the management. Such a scheme is not and cannot be permanently satisfactory.

As these plans have failed one after another, other schemes have been proposed to take their place. It was felt that the interest of the workman, which the usual profit-sharing scheme had failed to arouse, might be secured if the workman were to get more

quickly the benefits of his increased activity. A straight piece-rate which would secure him such a benefit would carry with it the temptation to the management to cut; so the scheme was evolved of setting a standard time, based on experience, in which work could be done, and then dividing with the workman any time saved by the latter over the standard time. This amounts to notifying the workman in advance that, after certain earnings on a piece-rate basis have been reached, his rate will be cut one-half. Crude as it is, this premium system has been successful for limited periods in many cases. The management makes its cuts once for all in advance and the workman knows exactly what is coming. Unless some cut is made which is not scheduled, the men will work under this scheme with considerable interest and profit both to themselves and to their employer.

But this scheme also usually fails in the long run because it has not cured the fundamental weakness of both day- and piece-rates: to wit, uncertainty as to what is a fair day's pay and ignorance as to what is a fair day's work. In short, none of the current and historic methods of wage-payment satisfy the popular demand for equivalence incorporated in the expression, a "a fair day's work for a fair day's wage," for the reason that neither side of the equation has been until recently definitely determined. Where there is only uncertainty as to what constitutes either a day's work or a fair wage, there can obviously be no satisfactory solution of the problem.

So far as I know, the first recorded successful attempt in history to determine either side of the equation accurately and scientifically was made by Mr. Frederick W. Taylor at the works of the Midvale Steel Company thirty years ago. As foreman in the plant, Mr. Taylor found himself involved in the usual conflict over wages; and he observed that no matter what scheme he tried, he did not secure permanent satisfaction among the workmen or the employers. Nobody really knew what ought to be expected as a day's work. He set out, therefore, to devise a method to determine accurately if possible what a fair day's work was, and then to pay for the performance of this work in proportion as it exceeded the ordinary commonly accepted day's work on which the ordinary rates of pay were based.

As the result of several years' study and experimenting, Mr. Taylor evolved the method of time-study and the differential piece-rate which characterize his system of scientific management today. Where the differential piece-rate prevails, there are two rates for each product: one known as the low rate and the other as the high rate. For example, time-study shows that it is possible to produce 10 units of a certain product in a day; for each of these units the workman gets 35 cents, provided he produces the 10. But, if he produces less than 10, he gets 25 cents per unit. If he produces 8 units, he gets \$2.00; if 9, \$2.25; if 10, he gets, not 10×25 cents but 10×35 cents, or \$3.50. This obviously provides a strong incentive to a man to accomplish the production on which the high rate is based.

The essential feature of the system is, however, that the standard production (known technically among the Taylor group as "the task") must be based on an accurate time-study; and it must be determined with the same impersonal and dispassionate desire for truth that actuates the scientist in his laboratory. The work to be studied is divided first into its elementary operations, and the time in which these operations can be performed after methods and materials have been standardized, is ascertained by a long-continued series of tests on an average man fitted for the job under observation. The requirements are intelligence, patience, analytical power, and the capacity for accurate observation on the part of the time-study man (for whom we should like to adopt the French name *chronométriseur*), and honesty and skill on the part of the observed. Given these qualifications, the determination of a fair's day's work is a mere impersonal study of a physical fact. It is simply answering the question how long it takes to do a given thing, and the answer does not depend on any man's personality; it makes no difference whether the time-study is done by a union leader or by the owner of the works, by an old man or a young woman; personal interest plays no more part in it than it does in the measurements of an astronomer or physicist.

Time-study then, when made by competent men trained in its technique and the technique of the industry under observation, defines at least one side of the equation: namely, the content of a

fair day's work. Such study, when properly made, includes allowance for necessary rest and other necessary delays. When these facts are determined and a minimum time established, the conclusion is a positive, impersonal fact, the result of observation; it is not a matter of anyone's opinion or interest, but a fact established in accordance with the approved methods of scientific investigation.

Time-study, while but one element of the Taylor system of management, is typical of that system in its scientific method; and this characteristic method is that which has gained for the Taylor system the name of "scientific management." When such time-study is instituted in a plant, it involves the standardization of administration and of equipment, materials, and methods, and therefore implies a radical and revolutionary reorganization of the plant. The establishment of a fair day's work (the task) and the institution and maintenance of conditions which will enable the workman to accomplish this work and earn the increased compensation known as "the bonus," cannot be done successfully in a plant managed by the old methods. It requires more than a new mechanism; it requires a new mental attitude on the part of the management, the attitude of the scientific investigator, which is as free as possible from personal interest, and which assumes nothing that cannot be ascertained and proved; it means a new moral attitude—a substitution of the passion for truth for the reliance on guess work, ignorance, and bluff which has heretofore prevailed.

The usual method of setting piece-rates makes no claim to being scientific, even if in some cases it may be honest. Some plants establish their rates as the result of a series of observations of the time similar jobs have taken in the past; but as these observations show widely varying times for the same work, an average is taken which is simple arithmetic and nothing else. Others set a rate on the basis of what they can afford to pay in the prevailing state of the market. New rates are almost always set by someone's "judgment" which is merely a term for a more or less experienced guess.

For all these methods the Taylor system substitutes the method of the scientific observer. If the observer, being human and in some cases more in sympathy with the management than with the

men, allows his scientific judgment to be swayed by his desire to make the day's work as large as possible, he cannot do otherwise than overstep the mark to the extent of setting a task which cannot be accomplished. But this process is self-defeating, for if the task cannot be made, the bonus cannot be earned, and the men will not attempt to do the new day's work. The management thereby loses more than the men, and the intrusion of a greedy bias kills the goose that lays the golden egg.

The Taylor system therefore puts a firm foundation under one pier of the arch which is to bridge the gulf between employer and employee, in that at least it makes it possible to determine what is a fair day's work. What does it say about a fair day's wage?

Scientific management does not today attempt to establish what is a fair day's wage. It takes the prevailing rate of wages in the community and then proceeds to add to that a bonus in proportion to the achievement secured in excess of the ordinary achievement in that community. This process, however, leaves the basic rate to be determined as before; that is, by the ordinary daily bargaining in the market. We have seen that in this bargaining the disadvantage at which the workmen is placed by his dependence upon his work for a living has subjected him to abuse at the hands of his employers. Legislation has failed to determine a fair day's wage. It can set a rate of payment, but, until it sets the amount of work that is to be done for that rate and enforces the performance of the standard amount of work set, the rate is futile. In this fact lies the fundamental weakness of minimum-wage legislation. The law cannot compel an employer permanently to pay \$8 a week, unless it can also assure him workmen who can and will produce at least \$8 worth. Experience has shown that the good-will of the employer cannot be depended upon permanently to maintain a fair day's wage. Public opinion also has failed, for the reason that, while in an abstract way each man wants justice for the other fellow, he is not willing to make much personal sacrifice in the way of paying higher prices for the other fellow's product. Each member of the public wants to buy everything as cheap as he can get it, even if this cheapness involves someone's else low wages.

In my opinion it is as true today as it was a century ago that the

final resort of the workingman is in the collective force of organized labor. Under scientific management or any other system, the workmen must depend upon their combined power to enforce a minimum wage. But this policy will not succeed in the future any better than it has in the past, unless the demand for a minimum wage is accompanied by the promise and guaranty of a quantity of work which will warrant that wage. There is no possible harmony between scientific management, large output, and the social interest on the one hand, and mere unintelligent force, restriction of output, and class interest on the other. But the labor union which will adopt the policy of establishing a minimum wage as a basic rate on which a bonus, determined by the conditions of the industry, shall be paid for the performance of a proper day's work, and which, in addition, will assist if necessary in determining what a proper day's work is, and in enforcing the performance of that work on the part of its members, is acting at once in its own interest and in that of society. This would be a long step toward the solution of the wage problem and would help to bring about that co-operation of employee and employer which we all desire and hope for but rarely see.

It is something more than a dream that labor unions are sooner or later going to take over scientific management and make it their own. They have already established their right—by force, to be sure, as most rights are established—to determine a minimum wage. They have established their right to safe and sanitary conditions of work. There are cases on record where they have gone to the management and said: "You will have to scrap that obsolete machinery and put in new machinery." They have complained to state commissions of the obsolete equipment of railroads. They have even struck to compel the management to instal the Taylor system, and have done this, not because they were primarily interested in large output or higher profits for the management, or even in a lower cost to the consumer, but because they were intelligent enough to realize that in industry as elsewhere, knowledge is the foundation of justice, and only that method of management based upon knowledge can answer permanently the question of fairness.

Along this line a union can and should say to its employer:

"We do not care how much profit you can make out of your business but we insist upon having fair wages, and if you cannot make enough by your present methods to pay us fair wages, you must, if you want to employ us, organize your business on the most modern and scientific plan, so that you *can* pay us."

When labor unions arrive at that point of view, as they will when they get a type of leadership which is more interested in securing the welfare of their members through peaceful progress and co-operation than in earning their salary by fomenting strife—when they take over scientific management and say: "We believe in this and will help it because it means larger output, lower cost to the consumer, higher wages for ourselves, prosperity for the employer, general satisfaction and a higher standard of living; and because it is good for us we insist that you shall adopt it"—then we shall have a type of co-operation which is permanent because it involves fundamentally the welfare of both parties. And in this I believe I see as near a solution of the wage problem as we are likely to reach under our current form of industrial organization. This involves not the weakening but the strengthening of organization of both employers and employees, and the assumption of greater responsibility on both sides. It can come only with the increase of knowledge and under the predominating influence of a desire for truth and justice; and as usual the world is being driven toward truth and justice by the stress of the conflict brought on by ignorance and injustice.

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